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Between participants, props and stage: Eliciting insights through interaction

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ABSTRACT
How can we develop innovative concepts? The purpose of this paper is to investigate how generative prototype sessions can elicit so-called tacit and latent knowledge from participants through interaction and play. To illustrate this, a session from the design process will be described along with a brief take on current theories. It is discussed how practical tools and methods along with the dynamics occurring during such a session can translate actor knowledge to become useful throughout a the entire design process. The paper concludes that knowledge gained from generative prototype sessions is an indiscernible blend of different types of knowledge, but that tacit and latent constitutes an important part.

KEYWORDS
Design research, co-creation, staging, generative prototypes, knowledge, product development.

1. INTRODUCTION
The design case for this project is to develop a new concept for fire fighters, ensuring effective and safe operations in fire and smoke. It is part of a master thesis project carried out at The Technical University of Denmark, Design & Innovation. Actor Network Theory is used as the overall methodological framework for this project to analyse interaction.

1.1 Theoretical basis
To design more innovative future products, it is necessary to reach a deeper knowledge within the relevant actors [7]. This so called tacit and latent knowledge contains what the user knows, feels and dreams [11]. It is proposed that tacit and latent knowledge could be reached through *generative methods*. Figure 1, illustrates how different research methods reveal different levels of knowledge. So, to create innovative concepts, generative sessions seem to be an interesting method, with artefacts, henceforth called *props*, needed to facilitate a generative behaviour. It is furthermore indicated that it is far more complex than illustrated above how the different types of knowledge interact [8].

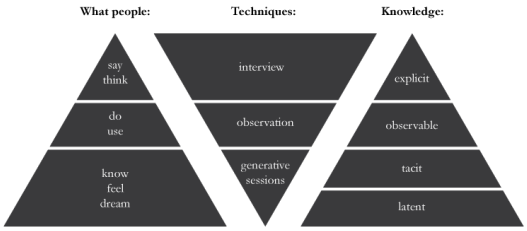

Figure 1: The different types of knowledge and techniques, adapted from Visser et al [9].

We have found that it could be promising to use *prototyping* as a generative prop in generative sessions, as it is argued that the interaction between *prototypes* and relevant actors (e.g. users) can be used as a tool to express subconscious knowledge and emotions [10]. These prototypes are defined as *generative prototypes*, and have to be created from different props by relevant actors. We call this combination of session and prototypes, a *generative prototypes session*.

Such *sessions* have to be conducted with participation from relevant actors, which is in line with the perception that users (relevant actors) should become active co-creators in the design process, rather than take a more traditional passive and reactive position as sources of knowledge [9].

Enactment of *generative prototypes* can be used for further revealing and envisioning the knowledge related to the future [4]. It is argued that knowledge is based on experiences, which are determined by the past, but contains wishes for the future [9]. Thereby, it becomes possible to experiment with future needs through enactment. As such, a prototype can be perceived as an artefact that lets the participant convey future experiences.

A *generative session* does not become generative and the participants do not become co-creators by themselves. *Staging* is a reflective way to describe the interaction between a stage (room), participants and props through different activities. Users or actors are experts on their own practice so designers have to *set the stage* for this knowledge to be revealed [3].

Therefore, it becomes central to apply tools in a generative session, to let the participants take responsibility and express their knowledge and experiences. These factors can, to some extent, be controlled by the design of the session [1] and hereby *staging*.

To sum up, *generative prototype session* should be a method to reveal tacit and latent knowledge creating a basis for innovative concepts. This is done both through creation and enactment of the

generated prototypes. Additionally, props should be added together with *activities* to *set the stage* of the session.

The following is a description of an attempt to stage and conduct a generative prototype session. The session was based on the described theory and principles to obtain tacit and latent knowledge from the fire fighters about their mask and water nozzle.

1.2 Staging ideas and knowledge

The session focused on generating ideas, thereby reflecting the current phase of our design process. The overall goal was to obtain tacit and latent knowledge through these ideas. The session was planned to *inspire,* then *create* and finally *enact*.

To make the session generative and support interaction, different props were developed.

Initially, a short introduction was given about the session and the six participating fire fighters were divided into two groups, with one designer in each team to facilitate.

1.2.1 The stage

A high table in the garage of the fire station was chosen as the stage for the session. From our experience, standing up in workshops and meetings makes it less likely to dwell or be passive. The garage was also chosen, as it was a more natural stage for the fire fighters associated with serious work and maintenance of equipment.

1.2.2 Idea cards

To inspire the fire fighters, *idea cards* were created. These represented small drawings from one of our brainstorms. They were intended as props to initiate interaction and assist dialogue between the participants and other props. The cards were meant to create an atmosphere, where wild ideas were allowed, as some of the cards contained unfeasible and funny ideas.

Picture 1: Idea cards in use

To get things started, each team was asked to take a look at the *idea cards* for inspiration, if necessary, and choose 2-4 principles and conceptual ideas. These ideas should be added to the premade *basic shapes* to kick-start the prototyping.

The *idea cards* definitely interacted with the participants as intended, to kick-start discussion. Between us, it was discussed if the cards would hinder the participants in developing their own ideas. This seemed not to be the case, and the participants only used them as starting points, perhaps due to the more wild ideas included in the set.

1.2.3 Basic shapes

In an earlier session, it had become evident that the fire fighters were not likely to interact with given material on their own. It can be quite demanding to ask participants to be creative and build

Picture 2: Example of a basic shape of a breathing apparatus

from scratch. Semi-finished prototypes invites to participation [9] and could therefore be used as a principle to obtain co-creation and future possibilities [5]. This argues for creating material for prototyping that have prebuild elements or structures that can be altered in an easy manner.

Therefore, *basic shapes* (semi-finished prototypes) of existing equipment were created in foam and cardboard. This should give the participants a 'head start' in the prototyping. The materials for the prebuild *basic shapes* were white and simple, to underline that the final prototypes should be kept primitive. The materials given to alter the *basic shapes* were markers, foam, foam cardboard, elastic bands and various items to stick elements together.

The participants used the *basic shapes* of nozzles and masks to enact how components and added functionalities work. Difficulties arose when it came to assembling the representations and the materials into prototypes, even though they had good ideas. In this situation, we took the role of assembling the *basic shapes* and *props* under guidance of the participants. This was done with as little interference from our side as possible, so as to not affect the original ideas of the participants.

We believe, that it was helpful to use *basic shapes*, and this indeed helped start the prototyping, as it has been stated in theory. Moreover, the *idea cards* were a helpful tool to let the participants interact with the *basic shapes*. The discussions while creating prototypes highlighted important points and problem areas of the fire fighters. This gave valuable knowledge and criticism of our ideas and the fire fighters' work in general.

The generated prototypes now contained knowledge from the participants as they were built on their command. By adding the prototype props, the basic shapes were altered, adding new knowledge while creating the prototypes. In theory, the prototypes should contain tacit and latent knowledge. The problem is that this kind of knowledge is unspoken. The generated material had to be analysed to extract the explicit knowledge. In our perception it is difficult and would be based on *our* interpretations, which may lead to uncertain results. This is why enactment was introduced as an activity of the session.

1.2.4 Enactment

The second and last part of the session was meant as a presentation of the different prototypes to the other team. A fire fighter, who had been rather quiet during the first part of the session, took the nozzle prototype and started presenting. On his own, he started enacting the prototype, illustrating its use. It was interesting to see how the participants acted differently and started interacting by themselves. Through this interaction, they showed what support they needed in their work.

Picture 3: Enactment of a prototype representing a mask

The enactment of the generated prototypes helped create interaction. Moreover, this was completely self-propelled. This led us to take on the role as observers. We argue that enactment is easy to do with participants. Moreover, it helps to reassemble the context and start a discussion. The problem with the enactment might be that it is very dependent on the previously generated prototypes. The dynamics within the enactment are interesting, since it allowed the knowledge embedded in the prototypes to become articulated. The generated prototypes can therefore be seen as translators for knowledge. Moreover, an enacted prototype helps articulate the embedded knowledge, through activation of dynamics between participants and props.

The session ended with thanking the participants and explaining how the results of the session was intended to be used as input for the further design process.

1.3 Knowledge transfer

The reason for having these generative sessions is to transform knowledge from the user into a final design. This will be illustrated through an example from the session. Both teams, independently of each other, had a focus on a nozzle for one-handed operation:

"Sometimes you hold, for instance, a ceiling tile […] then you need to let go and turn on the water. That is annoying. […] If you make a trigger, here, [to give one-handed operation] it would be brilliant." – Session participant 1

"Then you could think it further and make a switch, like this, that changes the water beam [all with one hand]. When you are lying [on the ground], you could change everything with the other hand free to support you." – Session participant 2

Back at the office the statements and observation from video were processed. The knowledge was put on post-its and added to an *affinity diagram* [6]. Here, it became clear that this particular expression conflicted with knowledge from previous interviews. It had been expressed that they did not need their hands free to do other stuff. But through the sessions this latent need was articulated.

The knowledge from the example above was translated into the design process and resulted in placing a thermal camera in the mask instead of carrying it in the hands as they do presently.

2. Dynamics in knowledge

In this part, it will be discussed how knowledge can be a result of the interplay between participants, props and the staging. We will unfold how props translate into prototypes as shared knowledge.

When talking about translating knowledge from sessions to design process, it would be preferred that the knowledge would stay intact and unaltered. We will argue that artefacts that translate knowledge with little or no disturbance, should behave as intermediaries. We have adopted the framework of intermediary objects from Boujut and Blanco [2], to describe the process from prop to prototype. These objects, will have the ability mediate, translate and represent knowledge from participants into the design process.

We will argue that our props act as *boundary objects* and are *ambiguous*. Thereby, a prop that enters a *stage* both ties the acting together, but also points out the differences between the participants. The ambiguous element of props are linked to negotiations through the participants' different interpretations of the artefact and its script. Thereby, *props* must be perceived as complex *mediators* as they enter the stage. But these mediator props, becomes artefacts that could be defined as objects of negotiation within the creation. This seems to support the eliciting of knowledge.

We will argue, based on the case that the creation of the shared representations of knowledge, a prototype, happens through negotiations initiated by the ambiguity of the props. Through negotiations, knowledge, participants and props are mediated towards a common understanding represented by the production of a prototype. We will argue that the negotiation create *disambiguation* [2] in relation to the elicited knowledge. Moreover, artefacts are an externalisation of knowledge [2, 8], and thereby translates implicit knowledge to an explicit state. This seems to leave the generated prototypes and the process as a true, shared representation, which define the network between the actors. Clearly this is a mediation of knowledge and an *alignment* of the *temporal actor network* within the session. We will therefore argue that the complex ambiguous props are interpreted and negotiated into a shared knowledge representations, as prototypes, through mediation and knowledge conversions [8]. Thereby, it could be argued that props as mediators are translated into intermediary objects and might end as stabile intermediaries within the session itself. We will argue that this process based on intermediary objects creates dialogues that elicit important and implicit knowledge suitable for the design process.

After the session, the generated prototypes are translated into the design process. We have experienced that the prototypes through this translation again becomes uncertain mediators of knowledge. This could be explained by perceiving the generative prototypes to only be a shared representation in form of the relations they create within the session as a temporal actor network. The translation seems to change the generative prototypes into strong mediators. As such, we believe that it is too uncertain to interpret the prototypes themselves outside the *temporal actor network* of the session they were created in.

As we found, the generated prototypes acts as mediators once taken out of the temporal actor network, other methods had to be used to translate knowledge from the session to the design process. We will argue that our video recordings, if done impartially, preserved the session and could therefore also be seen as *intermediary object* [12], even when taken out of the network. The video was co-reviewed and turned into post-its to form an Affinity Diagram. Through these negotiations this diagram could also be defined as an intermediary object. We have found these methods suitable for translating knowledge from sessions into the design process while preserving the meaning of the knowledge.

The interesting thing with the generative session is that it had not just revealed tacit and latent knowledge. We experienced that all types of knowledge was revealed. One explanation is that the session consisted of more than just generative methods. While

participants created they also discussed and for this, the enactment was an important tool. Thereby, knowledge was a result of interactions based on articulations, observations and creation of prototypes. We believe it was important for the staging of the session to apply a combination of methods. A generative session can then deliver all kinds of knowledge.

We have to distinguish between the types of knowledge to create innovative solutions since only tacit and latent knowledge can do so [5]. But in our case it is difficult, maybe even impossible, to distinguish between them. It is described that these different types of knowledge are created through interaction between tacit and explicit knowledge [8]. Therefore all kinds of knowledge are needed and valuable.

It is clear that tacit knowledge is indeed useful. However, is it useful without explicit knowledge? It seems obvious that explicit knowledge is as important to understand as implicit knowledge. But the roles of the knowledge might be different. Explicit knowledge creates a foundation for understanding implicit knowledge. Whereas, implicit knowledge can create innovation. Obviously, the implicit needs a foundation to be turned into a design. Perhaps it is not tacit knowledge alone that creates innovative results, but a holistic and detailed understanding of the participants and their context. Generative methods can contribute to deliver these last pieces to the puzzle as shown in Figure 2.

3. Conclusion

As a design method, the generative prototype session provided valuable knowledge in relation to the design process. Moreover, we believe that this knowledge could not have been revealed by interviews alone. Using generative props to create representative prototypes was a suitable method for revealing tacit and latent knowledge needed innovations.

The used *props*, *idea cards* and *basic shapes* (semi-finished prototypes) ensured dynamic session conduction, even though it was still difficult for the fire fighters to create the prototypes themselves. Enacting the prototypes seemed to be the most valuable tool, enabling the participants to articulate tacit and latent knowledge trough interaction.

The props should act as *boundary objects*, thereby creating a point of relation for the interaction between participants and designers.

We will argue that the ambiguous element is central for props to act as objects for negotiations. Without this machinery, mediation might never happen. Moreover, the negotiations translate implicit knowledge to an explicit state. Finally, the output, the generated prototypes, can be perceived as intermediaries as long they are in the temporal network of the session. Here one have to notice that, even though a translation has happened, the described artefacts are still boundary objects that binds the acting together. In other words, the translation of knowledge seems to happen within or together with the translation of the boundary object from a mediator to intermediaries through intermediary objects.

The creation of generative prototypes can, as they are intermediary objects, mediate, translate and elicit knowledge. Dealing with these intermediary objects, it becomes possible to translate the tacit and latent knowledge from participants into the design process with little interference.

One has to be aware of that all types of knowledge will be revealed in a generative session. We believe that all types of knowledge should be combined and processed to create an innovative and holistic concept. For the purpose of eliciting actor insights, generative prototype sessions are a suitable approach.

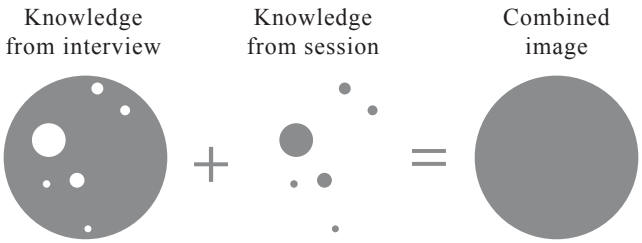

Figure 2: Innovation comes from creating a combined and ideally holistic knowledge image

4. Acknowledgements

First and most important, we would like to thank the team of fire fighters at Gentofte Fire Station (Falck) for their willingness and devotion to participating in the project. Without them, the project would not have obtained its value. Secondly, we would address a thank you to the TempoS project for support.

5. Further work

The final thesis report covering the entire development process and further discussions can be found at the DTU ORBIT webpage, by searching for our names at http://orbit.dtu.dk/. (Expected available from April 2012)

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